enLink OAQ

USER GUIDE

LoRaWAN Wireless Outdoor Air Quality Monitor

synetica

Contents

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LoRaWAN Wireless Outdoor Air Quality Monitor

Synetica's enLink OAQ outdoor air quality monitor measures key environmental parameters continuously and in real time with exacting accuracy.

Using cutting-edge digital and gas sensing technology, the enLink OAQ ensures drift-free reading without further calibration and extended instrument longevity. Designed and manufactured in the UK, the enLink OAQ records essential air quality data.

The outdoor air monitor can be battery, solar, or externally powered ensuring flexible installation options. Data is transmitted up to 16km using LoRaWAN long-range wireless seamlessly, linking data to the cloud, providing visual, easy to analyse data.

enLink OAQ:

- Temperature: ±0.2°C (typical), range: -40°C to +80°C
- Humidity accuracy: ±1.8% RH (typical), range: 0–100% RH (non-condensing)
- Pressure absolute accuracy (full range): ±0.6hPa
- Relative accuracy: (700-1100hPa), ±0.12hPa (equivalent to ±1m in altitude), range: 300-1100hPa
- Particulate matter MCERTS certified, EN 15267 compliant. Particles measured: PM0.5, PM1, PM2.5, PM4 & PM10
- Ozone accuracy*: ±10% (200ppb), range: 0 ppb – 2ppm, resolution 1 ppb
- VOC's: VOC IAQ Index and ppm (bVOC), range: 0 – 500 IAQ
- CO_2 accuracy*: ± (30, +3%) ppm (typical), range: 0 – 5,000 ppm
- Gas sensor accuracy*: ±5% F.S. (CH_2O ±10%)
- EPA AQI EPA Air Quality Index based on O_3 and NO_2 concentration, accuracy: ±15% (typical)

Features:

- Multiple sensor options*
- LoRa long range wireless
- Frequency Range 863-870MHz*
- Frequency Range 902-928MHz*
- Up to +18dBm Tx Power
- Built in USB port for configuration
- Tough, weatherproof design for extended instrument longevity
- Easy system set up
- MCERTS certified particulate matter sensor
- Subscription free, easy to analyse data
- Battery or externally powered
- UKCA, CE, FCC, RoHS compliant
- Made in the UK

Option / model dependent

1. Introduction

enLink OAQ accurately measures a range of key outdoor air quality parameters.

The device can monitor temperature, relative humidity, particulate matter, CO_2, Ozone, CH_2O, CO, NO_2, H_2S, SO_2, O_2, volatile, organic compounds, barometric pressure and sound levels.

The enLink OAQ has an MCERTS certified particulate matter sensor. Data is transmitted via long range LoRaWAN wireless for remote analysis.

The units can be either battery, solar or externally powered allowing for flexible installation options.

2. Configuration

LoRa devices can be configured using Over The Air Activation (OTAA) or Activation By Personalization (ABP).

OTAA is the most secure way to connect a device to the LoRa network. In OTAA, the device performs a join-procedure with the network, during which a Dynamic Device Address (DevAddr) is assigned and security keys are negotiated with the device.

ABP allows you to set the DevAddr as well as the security keys in the module. This is simpler than OTAA as there is no join procedure, however, it is less secure than OTAA.

This guide will illustrate using OTAA as it is the most secure and flexible method. The OTAA configuration requires the following parameters to be correctly set:

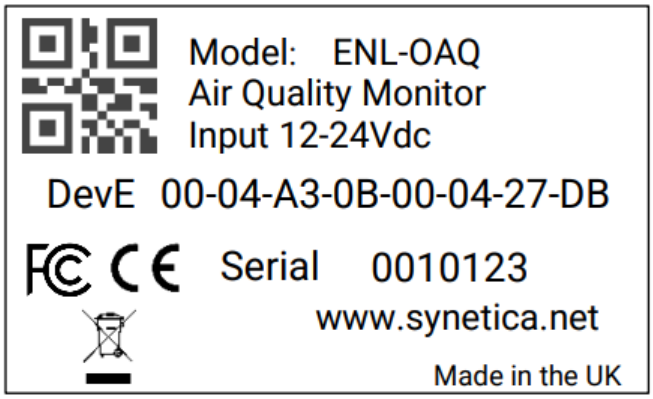
- DevEUI: End-device Identifier. It is unique for every device and is set at device manufacture.
- AppEUI / JoinEUI*: Application Identifier. Used to identify the end application.
- AppKey: Application Key. Used to create the session keys.

**Note: In LoRaWAN 1.1, AppEUI was renamed to JoinEUI.*

The DevEUI is always set at device manufacture and is unique. The device AppEUI and AppKey can easily be set via the USB connection if required and the process is detailed later in this document.

3. Join enLink Devices to the LoRa Network

enLink devices in wireless range and with the correct AppEUI and AppKey settings will automatically join the LoRa network when they are first powered up.



enLink OAQ Unit Label

The unique DevEUI is printed on all enLink devices and is also present in the QR code. The DevEUI can be used to identify the device once joined to the network.

4. Powering the Unit

OAQ units are available with three different power configuration options.

1. OAQ Models with an “EPP” extension have no onboard batteries. They must be powered by an ENL-OAQ-SPS Solar power supply or ENL-OAQ-XPS external battery pack. They can also be powered from an external 12-24V DC supply.
2. OAQ Models without an “EPP” extension have 4 x AA battery holders for powering the unit with 4 x Lithium 3.6V AA batteries. They can also be powered from an external 12-24V DC supply. The power switch is used to select battery or external power.
3. All OAQ units can be powered from an external 12 - 24 Volt DC power supply.

The OAQ models and features are summarised in the table below.

OAQ Model	CO2 Sensor	Internal Batteries 4 x Lithium AA 3.6V	External power from ENL-OAQ-SPS or ENL-OAQ-XPS	Power from external 12-24V DC
ENL-OAQ		•		•
ENL-OAQ-C	•	•		•
ENL-OAQ-EPP			•	•
ENL-OAQ-C-EPP	•		•	•

4a. Powering the unit via the on-board batteries

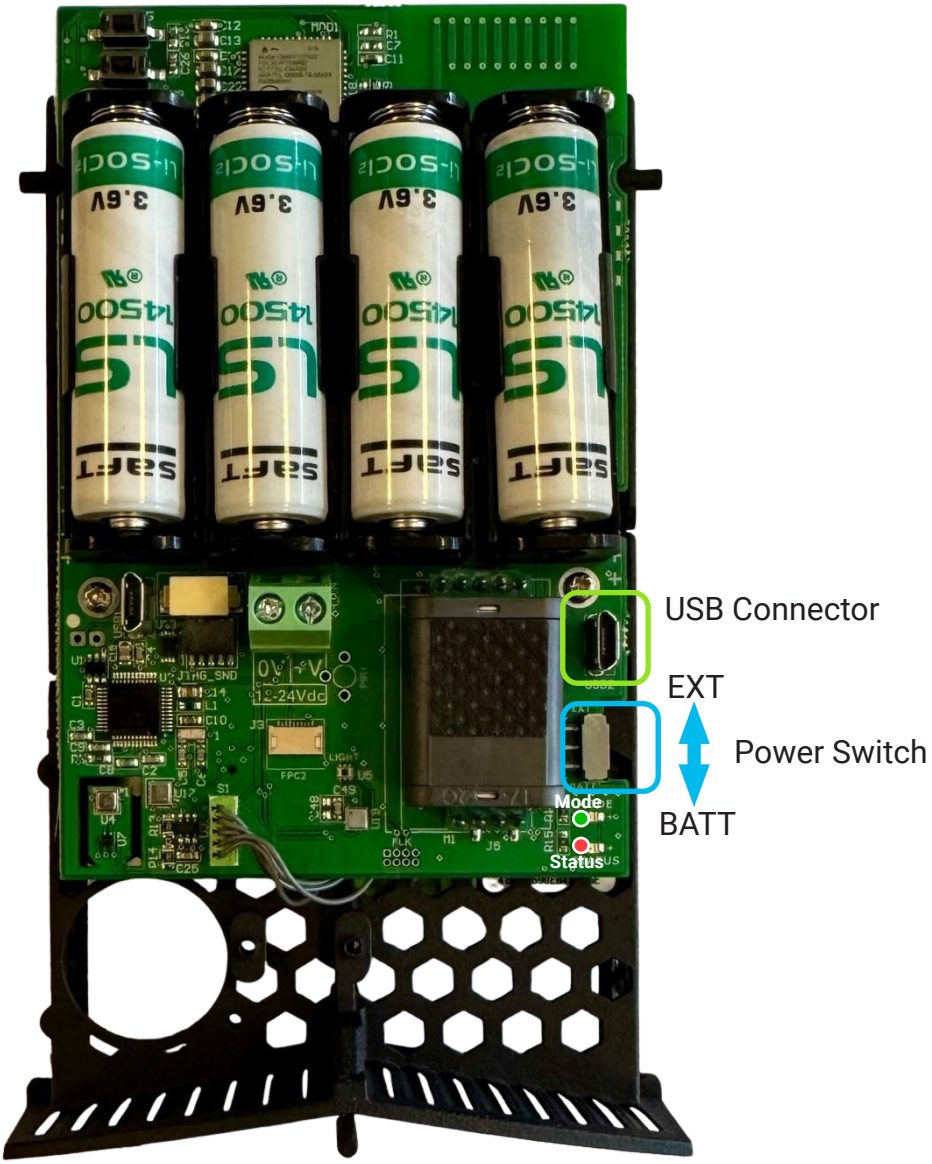
To power the device **ON**, first slide the power switch to the **EXT** position, to disconnect the battery power input. Insert the 4 x AA sized Lithium 3.6V batteries taking great care to insert them the correct way around. Locate the plus (+) and minus (-) signs on the battery and use the plus (+) and minus (-) guides on AA battery holders to insert the batteries in the proper direction. All four batteries face in the same direction.

Be sure to insert the minus (-) end first and remove the plus (+) end first when replacing the batteries.

Lithium batteries have very high energy capacity and a great degree of care should be exercised to ensure that all batteries are new, from the same manufacturer, installed the correct way around and are not in any way damaged. Refer to Section 15 for more details.

Check that the batteries are correctly inserted and then slide the power switch to **BATT** to connect the battery power to the unit.

Note that the unit can only be battery-powered or externally powered. When the switch is in the **BATT position**, any external power source is automatically disconnected. When in the **EXT position**, the batteries are automatically disconnected.



OAQ Sensor Cartridge

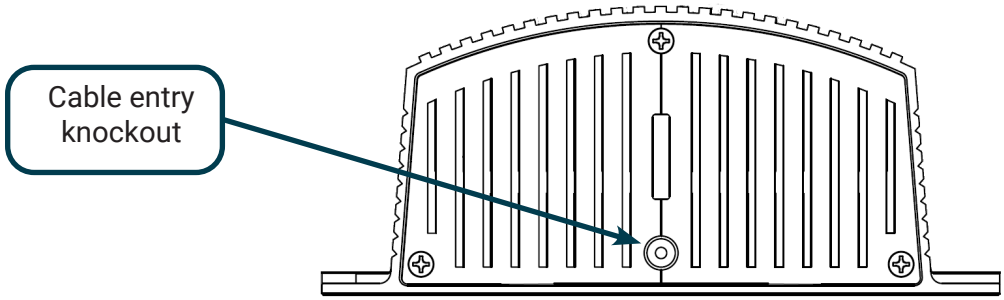
Once powered **ON,** the enLink device will send a join request message to the gateway. The status LED will blink RED whilst the join process is taking place. Depending on factors such as signal strength, RF interference etc. the Join process may take several seconds to complete.

When the device has successfully joined the network the Mode LED will blink GREEN for several seconds to show that the join has been completed. The LED's will then switch off to conserve the batteries.

4b. Powering ENL-OAQ-EPP and ENL-OAQ-C-EPP units via external power pack

OAQ units with model code **ENL-OAQ-EPP** and **ENL-OAQ-C-EPP** can be powered from the **ENL-OAQ-SPS** Solar Power Supply or from **ENL-OAQ-XPS** external battery pack. These models do not have any on-board batteries, they may optionally be powered from an external 12-24V DC power supply. See Section 4c for details.

To supply external power to the unit, first drill out the cable entry knockout as shown below with a 5 - 5.5mm drill. There is a moulded tongue behind the knockout to allow a cable tie to be attached to the cable to act as a strain relief.



OAQ Cable Entry Point

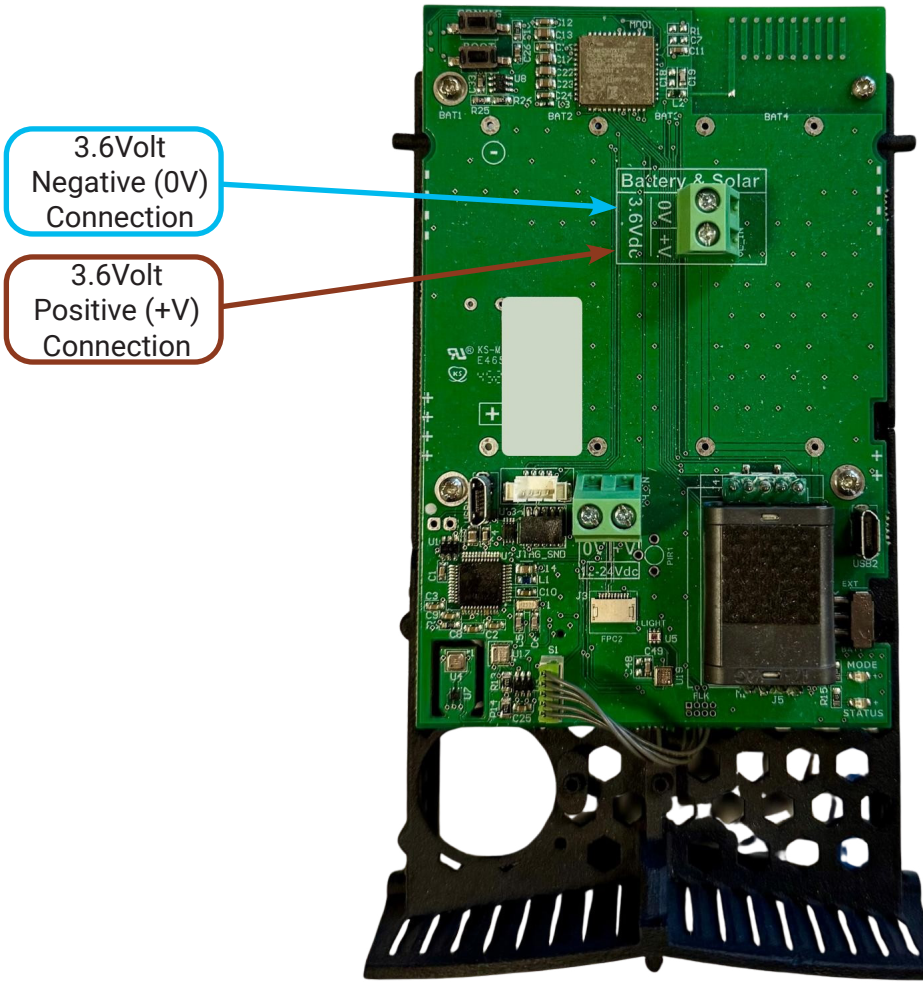
Power Connection Details

Before proceeding, slide the power switch to the **EXT** position, to disconnect the battery power input.

Power from the **ENL-OAQ-SPS** or **ENL-OAQ-XPS** external power supplies is delivered to the unit via a 2-pole screw connector, as shown below:

- Conductor size: 12–22 AWG (diameter: 2 mm–0.6 mm; cross-sectional area: 3.3 mm²–0.32 mm²)
- Cable preparation: Strip 5 mm of insulation to expose the conductor.
- Supply voltage: Must not exceed 5 Volts DC.

Connect the positive and negative wires to the terminals indicated in the drawing below, labelled “Battery & Solar”, taking care to observe the correct polarity.



OAQ External Power Pack Connector
ENL-OAQ-EPP and ENL-OAQ-C-EPP

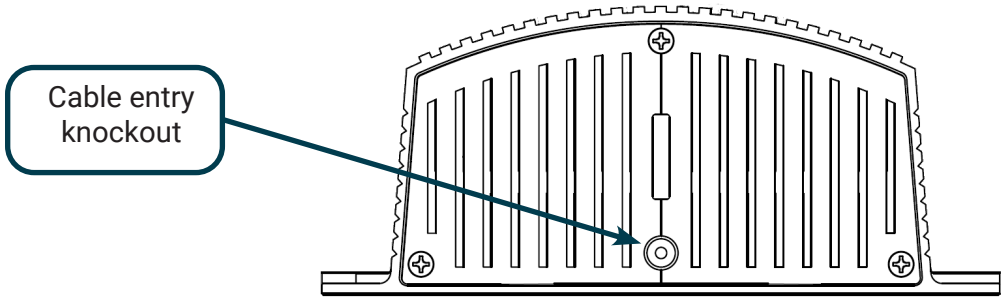
Check that the power cable is correctly attached with the correct polarity and then slide the power switch to **BATT** to connect the external battery power to the unit.

Note that the unit can only be battery-powered or externally powered. When the switch is in the **BATT position**, any external power source is automatically disconnected. When in the **EXT position**, the batteries are automatically disconnected.

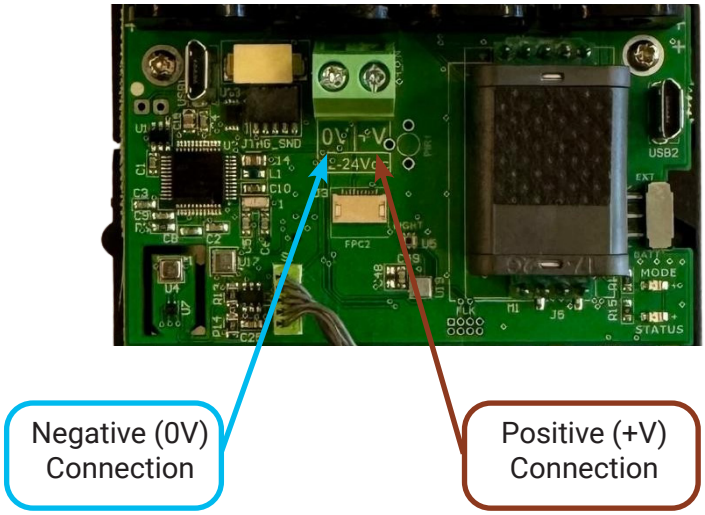
4c. Powering the unit with an external 12-24 Volt power supply

The OAQ may be powered from an external power source if required. The unit requires 12 – 24V DC at 200mA. Do not connect to a power supply which exceeds 28 Volts DC.

To power the unit, first drill out the cable entry knockout as shown below with a 5 - 5.5mm drill. There is a moulded tongue behind the knockout to allow a cable tie to be attached to the cable to act as a strain relief.



Power is supplied to the unit via a 2 pole screw connector as shown below. The conductor size should be 12-22 AWG (2mm – 0.6mm diameter, 3.3mm^2 CSA – 0.32mm^2 CSA). Strip the cable to expose 5mm of conductor.

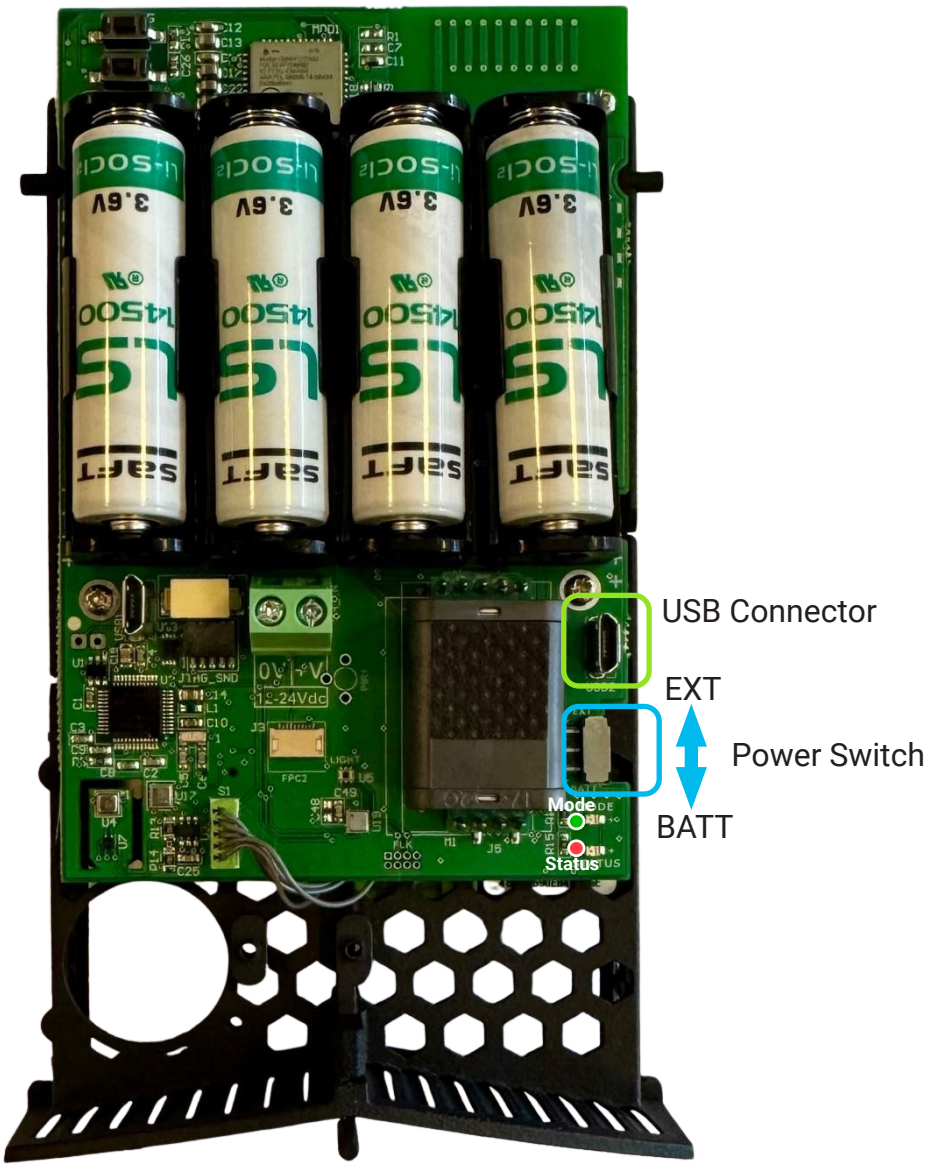


OAQ External Power Connector

Push the stripped end of the power cable into the connector taking great care to observe the correct polarity. The positive cable should connect to the terminal marked (+V) and the negative cable to the terminal marked (0V).

Gently pull on the cable to ensure that it is correctly inserted. Ensure that no uninsulated cable is showing.

Once complete, move the power switch to **BATT** position for the onboard or external battery pack or to the **EXT position** for external power as shown below. The unit will power up and attempt to join the LoRaWAN network.



OAQ Power Switch, Select EXT Position

5. Setting / changing the enLink LoRa keys

The LoRaWAN keys will be supplied in a seperate file for bulk upload to your LoRa Newtwork Server such as Chirpstack, Loriot TTN etc.

For some applications, Synetica can supply enLink OAQ units with the LoRa **AppEUI** and **AppKey** parameters preconfigured to your requirements, whereby if the LoRa gateway has matching keys the join process will happen automatically once the enLink OAQ unit is in wireless range and powered on.

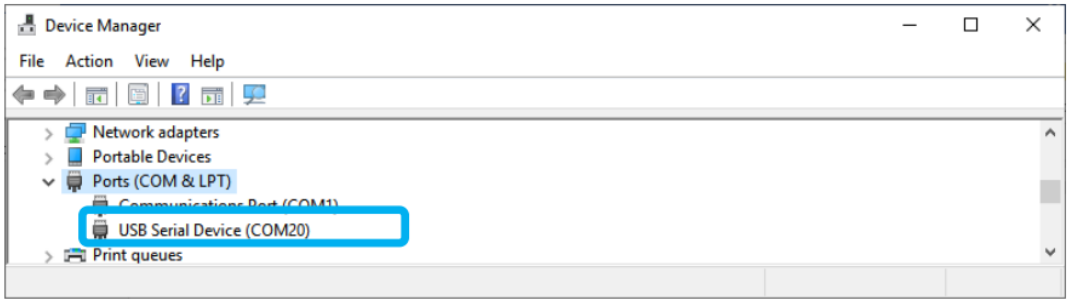
The DevEUI is always set at device manufacture and is unique. The device **AppEUI** and **AppKey** can easily be set via the USB connection as detailed below.

Once the sensor cartridge is removed, connect a micro USB cable to the enLink unit. There are two USB connectors on the enLink OAQ, so be sure to connect to the correct USB port (USB2) as shown in the image below. The device will attach to a COM port on your PC.

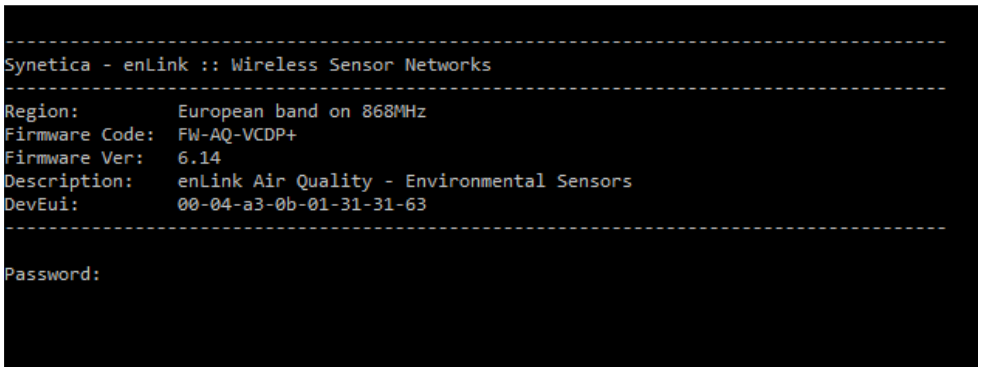
Configuration USB Port

Using a terminal program (e.g. Teraterm https://github.com/TeraTermProject/teraterm/releases) connect to the COM port used by the enLink device.

To verify which COM port is being used, check the Windows™ Device Manager (In Windows - Click the **Start** button, type **Device Manager** into the search box and tap **Device Manager** on the menu.) Expand the **Ports** (**Com & LPT**) menu as shown below.

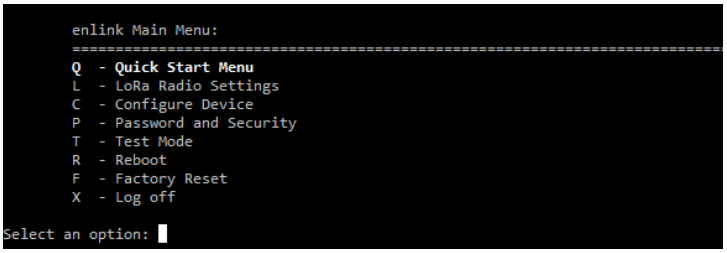


In your terminal program press the **Enter** key. An enLink summary screen will appear as shown below. The default password is the last four digits of the displayed **DevEUI,** in the screen below this is 3163.



enLink Logon Screen

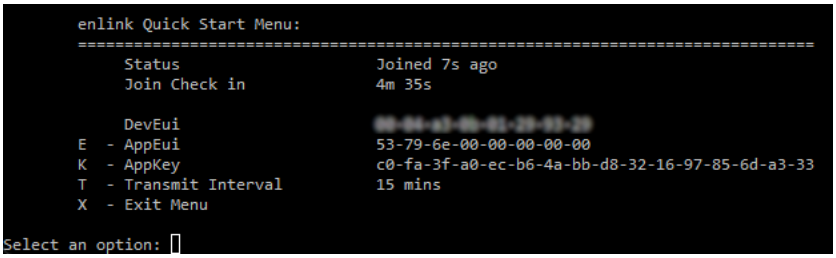
The screen below will show with the enLink Main Menu options. Enter **Q** to enter the **Quick Start Menu.**



enLink Main Menu

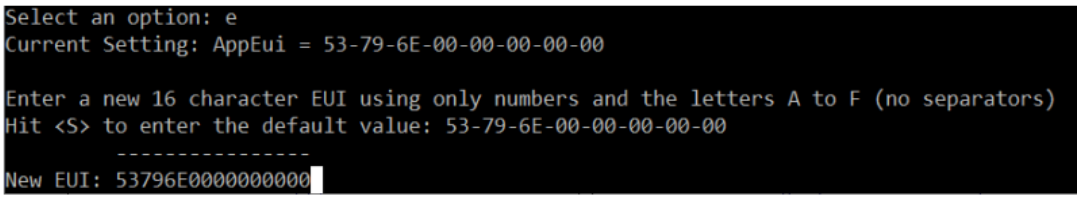
The **Quick Start Menu** contains only the parameters that normally need to be configured to setup the device and join the LoRa network.

From the **Quick Start Menu** you can change the **AppEUI** and **AppKey**.



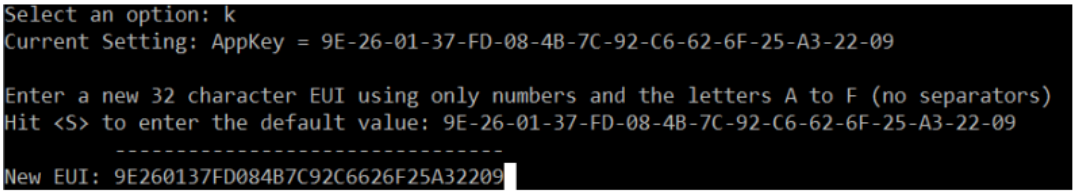
Quick Start Settings Menu

From the **Quick Start Settings Menu**, access the **AppEUI** setting by entering **E**. Enter the 16 character **AppEUI** using numbers and letters **A** to **F.** Do not include spaces or any other characters. Pressing **S** will enter the default **AppEUI** which you can then edit. Press **Enter** when the key is correctly entered to return to the **Quick Start Settings Menu.**



AppEUI Setting

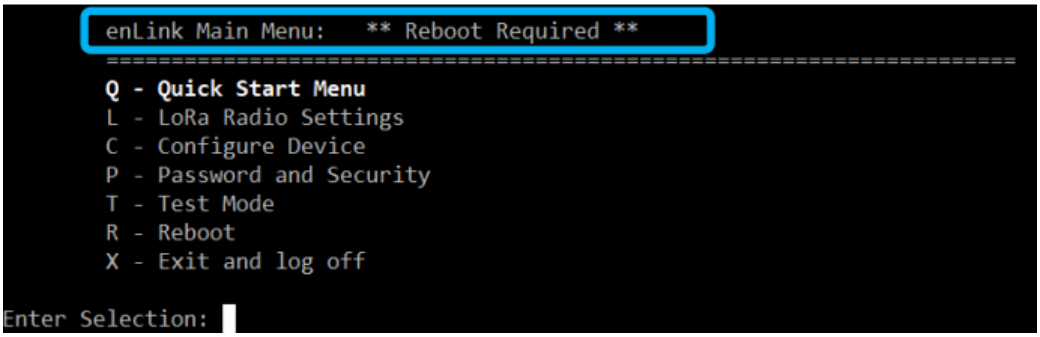
From the **Quick Start Settings Menu** access the **AppKey** setting by entering **K.** Enter the 32 character **AppKey** using numbers and letters **A** to **F**. Do not include spaces or any other characters. Pressing **S** will enter the default **AppKey** which you can then edit. Press **Enter** when the key is correctly entered to return to the **Quick Start Settings Menu.**



AppKey Setting

Press **X** from the **Quick Start Settings Menu** to return to the **enLink Main Menu**.

The header will show ** **Reboot Required** ** as shown below. The new key settings will not take effect until the enLink device is restarted. Enter **R** to reboot followed by **OK**. The device will restart with the entered **AppEUI** and **AppKey** and attempt to join the LoRa network.



Reboot Required Notification

6. Setting / changing the transmit interval

Access the Transmit Interval setting by entering **T** from the quick start menu.

Transmit Interval Settings

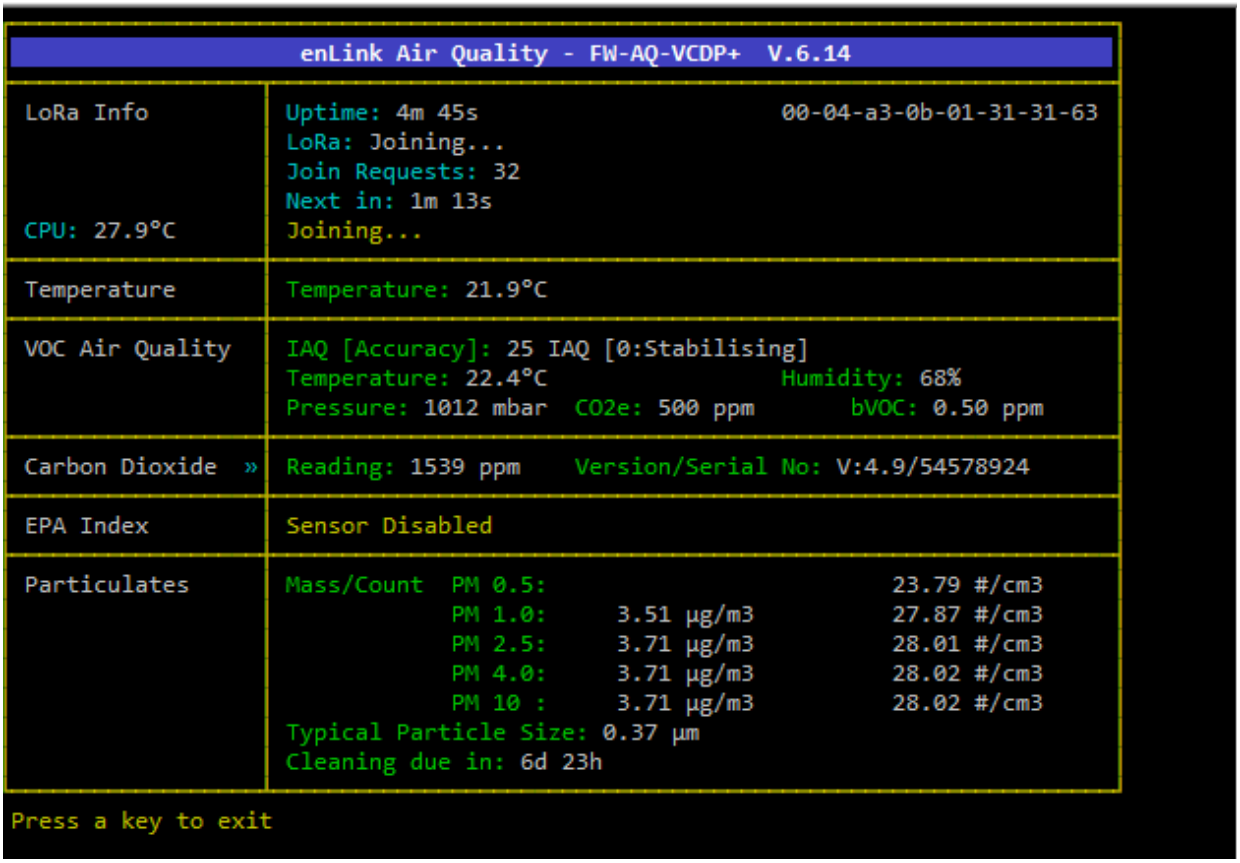
Select a fixed transmit interval from the menu options. 15 minutes or longer is recommended to extend battery life.

Press Enter when the key is correctly entered to return to the Quick Start Settings Menu.

The Transmission Interval may also be changed by using a LoRaWAN downlink message. See "https://github.com/synetica/enlink-decoder?tab=readme-ov-file#downlink-message-index-tables" for more details and example downlink messages.

7. Live Menu

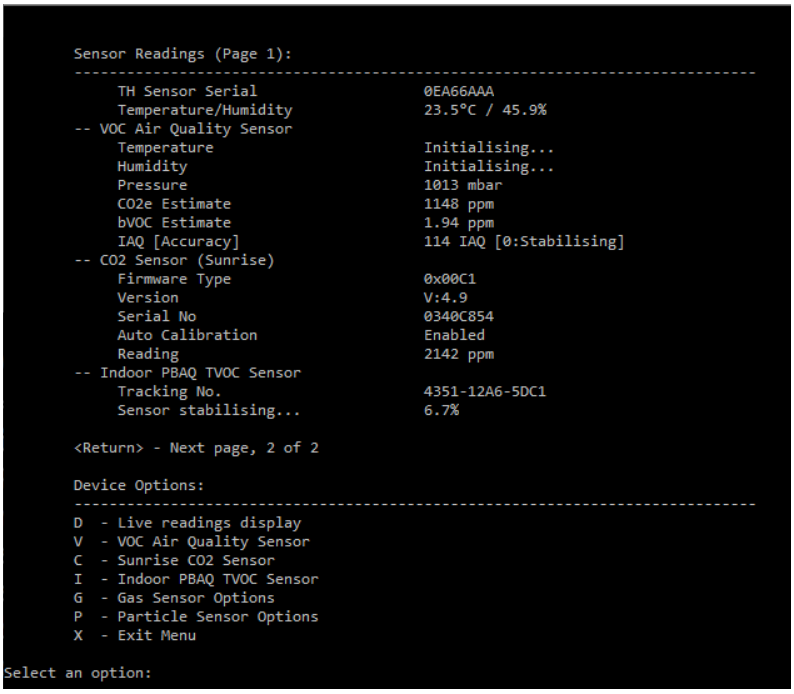
enLink OAQ incorporates a live data screen which shows all readings and device status for easy data validation. To enter the Live status screen, from the Main Menu enter **C** for **Configure Device** followed by **D** for **Live Readings** display. A screen similar to the one below will show. The sensors will vary according to the enLink OAQ model and the installed sensors.



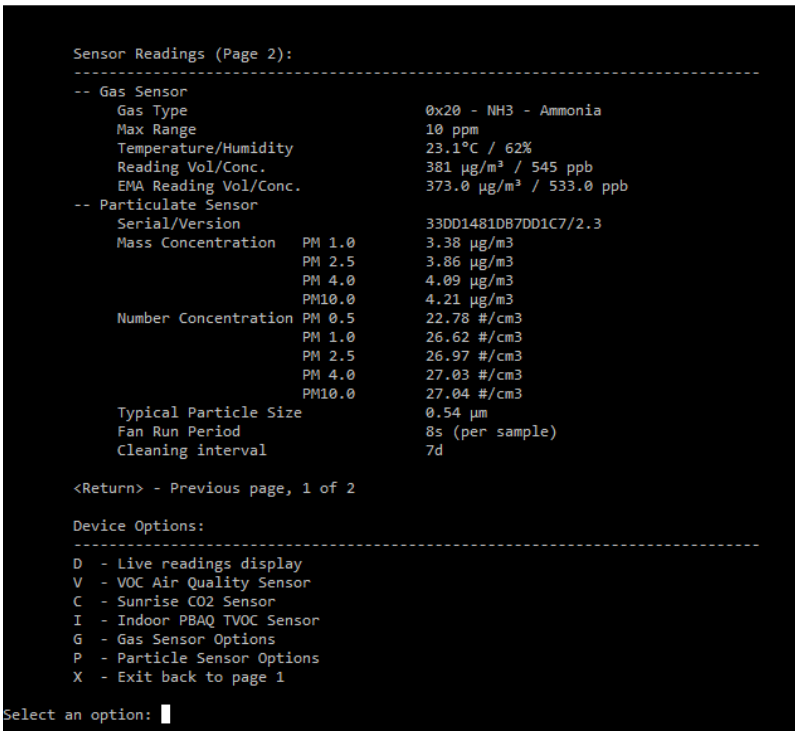
Live Display

8. Configuration Menu

The enLink OAQ Configuration Menu allows you to view current sensor readings and also to change various functions of their behaviour such as calibration data. To enter the Configure Device Menu press **C** from the **Main Menu.** A screen similar to the one below will show. The exact parameters shown will vary according to the OAQ model and sensors fitted.

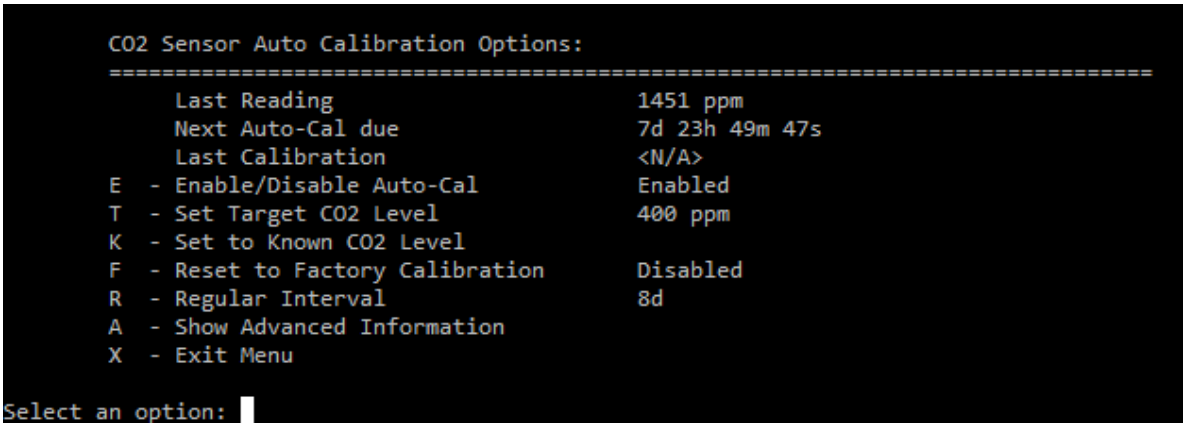


Page 1. Press the Enter (Return) Key to Show Page 2.



9. CO_2 Sensor Auto Calibration Configuration

To view and set CO_2 sensor calibration information, enter **C** and the screen below will show.



Please see the table below for information on each menu item.

Menu Item	Description Details
Last/Minimum Reading	Shows the last CO_2 value read and the minimum CO_2 value read since the last auto calibration.
Next Auto-Cal due	Shows when the next auto-calibration routine will occur
Last Auto-Cal result	Shows the value of the last auto calibration result. Used internally by the sensor.
Calibration Success	This shows the total number of successful auto calibrations since the device was powered up.
Out-of-bounds Ignored	Shows the number of times that auto calibration did not run due to the Out Of Bounds setting.
E - Enable/Disable Auto-Cal	Enables or disables the auto calibration routine.
T - Set Target CO_2 Level	This is the known CO_2 corresponding to the minimum value the sensor has read since power-up or last calibration. It is normally 'fresh air' or the lowest level when the building is unoccupied overnight or at weekends. Typically this is 400 ~ 450 ppm.
K - Set to Known CO_2 Level	This will re-calibrate the zero point of the sensor to a known gas concentration. The sensor should be placed in this gas concentration and allowed to stabilise. This command runs in the background and will take 8 to 10 seconds to complete. As an example, fresh air is typically around 400 ~ 450 ppm.
F- Reset to Factory Calibration	This resets the sensor to the factory calibration settings.
R - Regular Interval	This is the standard calibration interval, it is set to 8 days by default to accommodate a week long period where the minimum sensed CO_2 level should have fallen to background levels.
A-Show Advanced Information	Shows more advanced sensor information, such as, temperature, total reads, calibration target/ period, calibration success/fail and error count.

Many of the above parameters can also be set via LoRaWAN downlink message. See: https://github.com/synetica/enlink-decoder?tab=readme-ov-file#carbon-dioxide-sensor-downlinks for more details.

The CO_2 sensor needs to be exposed to fresh, clean air periodically for the auto calibration to be successful. Most occupied areas are unoccupied for some time during a week-long period, typically at night, or at the weekend and therefore the auto calibration runs every 8 days by default. Background CO_2 levels are typically around 400-450 ppm, if the background CO_2 level is known to be a different value then this can be set in the “Set Target CO_2 Level” parameter.

If a unit is placed in an area where the CO_2 level may not fall below a certain level, e.g. 450ppm, during the calibration interval then the “Out-of-bounds check” parameter can be set so that the auto calibration routine does not run. As an example, if an area is continuously occupied for a long period and the minimum CO_2 reading does not fall below, say 450ppm, then it is undesirable to run the auto-calibration routine based on a target of 400ppm. In this case, if the “Set Target CO_2 Level” is set to 400ppm and the “Out-of-bounds check” value is set to +/-50 ppm then the auto-calibration routine will not run unless the minimum read value falls below 451ppm in the interval.

10. Particulate Matter Sensor Configuration

To view and set particulate sensor information, enter **P** and the screen below will show.

```
        Particulate Sensor:
        ================================================================================
        F   - Fan run period                    8s (per sample)
        C   - Cleaning interval                 7d
        R   - Set values included in Radio Packet
        X   - Exit Menu

Enter Selection:
```

Menu item **F** sets the particulate sensor fan run time. The default is 8 seconds and is the recommended setting for most applications. The fan run time may be extended for certain applications, however this will have an impact on the battery life.

The particulate sensor has a self-cleaning function which runs the fan at high speed to clean away any dust build up in the measurement chamber. By default, this cleaning cycle operates every 7 days but may be changed if required Reducing the cleaning interval will have a detrimental effect on battery life.

The above parameters can also be set via LoRaWAN downlink message. See:
https://github.com/synetica/enlink-decoder?tab=readme-ov-file#particulate-sensor-downlinks for more details.

The particulate matter sensor is capable of reporting up to 10 parameters for mass concentration, number concentration and typical particle size. Individual readings can be removed from the LoRaWAN data packet if required to reduce the time on air and prolong battery life. The parameters can be enabled or disabled from the particulate sensor USB menu, or via a LoRaWAN downlink message. See the GitHub link above for more details.

```
        Particulate Sensor:
        ================================================================================
        F   - Fan run period                    8s (per sample)
        C   - Cleaning interval                 7d
        R   - Set values included in Radio Packet
        X   - Exit Menu

Enter Selection: r

        PM: Set values included in Radio Packet Menu:
        ================================================================================
        1   - Include PM 1.0                    ON
        2   - Include PM 2.5                    ON
        3   - Include PM 4.0                    ON
        4   - Include PM 10.0                   ON
        5   - Include PC 0.5                    ON
        6   - Include PC 1.0                    ON
        7   - Include PC 2.5                    ON
        8   - Include PC 4.0                    ON
        9   - Include PC 10.0                   ON
        10  - Include TPS                       ON

        A   - Set All ON or OFF
        S   - Select only PM 2.5 and PM 10.0
        X   - Exit Menu

Enter Selection:
```

Particulate Matter Values to Transmit

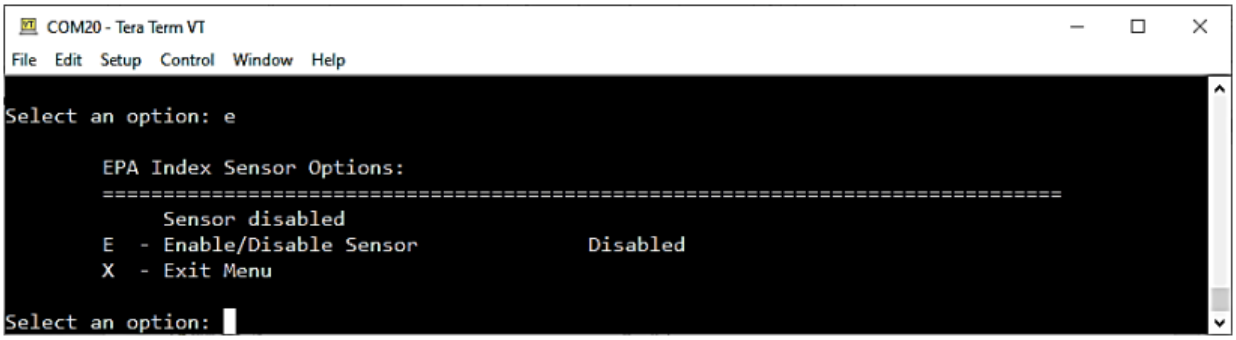
11. EPA Index Sensor Configuration

The OAQ has an EPA AQI sensor fitted, this is used to determine the Air Quality Index (AQI) based on nitrogen dioxide (NO_2) and ozone (O_3) concentrations.

The sensor uses moderate amounts of power when in use as it utilises an integrated heater and metal-oxide chem-resistor which measures the current amount of ambient ozone and nitrogen dioxide.

If the measurements are not required, then the sensor can be disabled to prolong battery life.

To view and set the EPA Index sensor parameters, enter **E** from the configuration menu and the screen below will show.



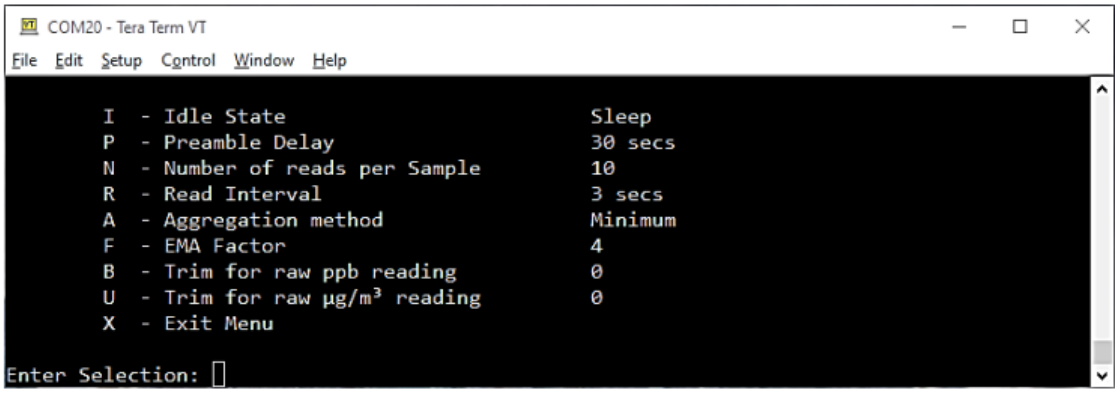
Enter **E** to toggle the sensor from enabled to disabled and confirm your selection.

12. Gas Sensor Configuration

The OAQ has the capacity for one additional gas sensor, some example gases and ranges are listed below: (other gas types and ranges are available, please contact Synetica for details.)

- AQS-CO-10 Carbon Monoxide, 0 - 10 ppm
- AQS-CH2O-5 Formaldehyde, 0 - 5 ppm
- AQS-H2S-2 Hydrogen Sulphide, 0 - 2 ppm
- AQS-NO2-5 Nitrogen Dioxide, 0-5 ppm
- AQS-NO2-2 Nitrogen Dioxide, 0-2 ppm
- AQS-SO2-5 Sulphur Dioxide, 0 - 5 ppm
- AQS-ODOUR-5 Odorous gas sensor, 0 - 5 ppm

To view and set the gas sensor parameters, enter **G** from the configuration menu and the screen below will show.



Please see the table below for information on each menu item.

Menu Item	Description Details
I - Set Idle State	Sets the power options for the gas sensor. When the gas sensor is not actively reading, the power can be set to Off, Sleep or On. Off mode turns the gas sensor off between measurements. This conserves maximum power, but is the least accurate as the sensor must stabilise to obtain the most accurate ppb level readings. Recommended for operation on battery power and where absolute accuracy is less important than battery life. Sleep mode places the gas sensor processor in sleep but keeps the gas sensor analogue stage active. This balances accuracy and power consumption, when combined with a preamble delay of several seconds, good accuracy can be achieved. Recommended for external power such as solar power where good accuracy is required and more power is available than just the onboard batteries. On mode leaves the gas sensor permanently powered. This mode uses maximum power and provides the most accurate ppb level readings. Recommended for externally powered units and where absolute accuracy is important.
P - Set Preamble Delay	Sets the stabilisation time prior to taking the first measurement. Longer preamble times consume more power. For good accuracy set to 15 seconds or 60 seconds for increased accuracy.
N - Set Number of Reads per Sample	Sets the number of readings taken per measurement. A value of 5 to 10 is recommended.
R - Set Read Interval	Sets the delay between readings. A value of 3 is recommended for most applications.
A - Set Aggregation Method	Sets the aggregation method. The readings per measurement can be aggregated as the maximum, minimum or average. Setting this to Minimum generally gives the best results at low ppb levels. Setting this to None uses the last reading taken.
F - Set the EMA (smoothing) Factor	To help smooth transients, the values can be averaged using an exponential moving average. The bigger the EMA factor, the greater the smoothing effect. A value of 4 gives good results in most applications.
B - Set trim value for ppb reading	Allows the ppb reading to be offset to align more closely with reference instruments.
U - Set trim value for µg/m³ reading	Allows the mass concentration reading to be offset to align more closely with reference instruments.

The following are example downlink messages to set the gas sensor to operate in the following mode:

- Idle State – Sleep
- Preamble Delay– 60 Seconds
- Number of Reads per Sample – 10 Reads
- Read Interval – 3 Seconds
- Aggregation Method – Minimum
- EMA (smoothing) Factor – 4

- Set Idle State – Sleep (0x01). Downlink message is: **A5 02 2D 01**
- Set Preamble Delay– 60 Seconds (0x3C). Downlink message is: **A5 02 2E 3C**
- Set Number of Reads per Sample – 10 Reads (0x0A). Downlink message is: **A5 02 2F 0A**
- Set Read Interval – 3 Seconds (0x03). Downlink message is: **A5 02 30 03**
- Set Aggregation Method – 1 Minimum (0x0). Downlink message is: **A5 02 31 01**
- Set the EMA (smoothing) Factor – 4 (0x04). Downlink message is: **A5 02 32 04**
- Reboot. Downlink message is: **A5 01 FF**

See https://github.com/synetica/enlink-decoder?tab=readme-ov-file#gas-sensor-downlinks for further details on configuring the gas sensor via LoRaWAN downlink messages.

Changing the gas sensor parameters can have a dramatic impact on battery life. See the Expected Battery Life table for more information.

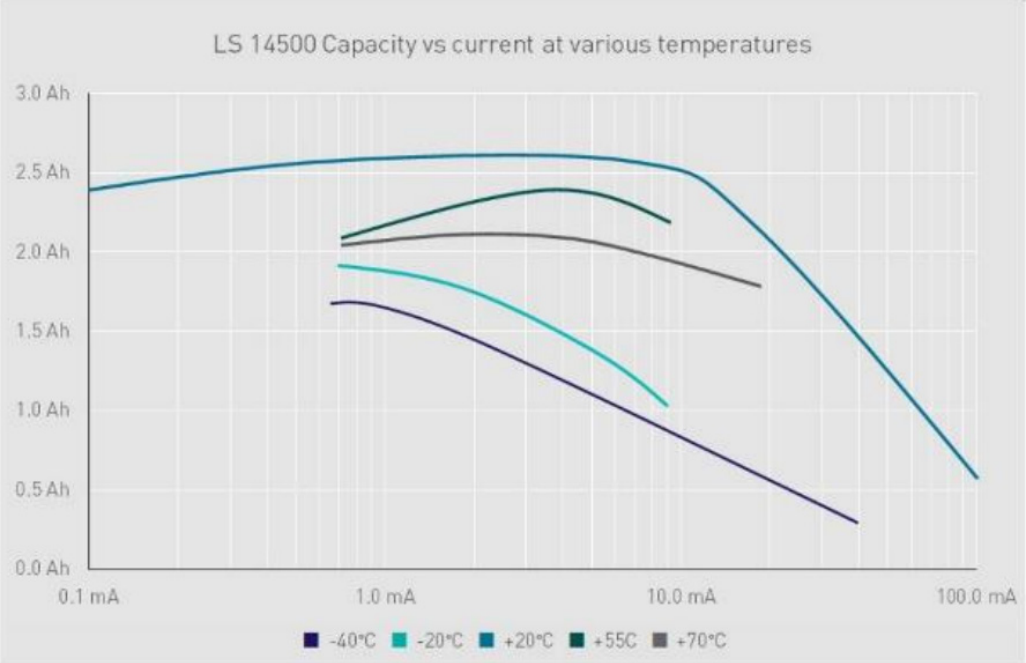
13. Power Considerations

The enLink OAQ can be powered with 4 x 3.6V lithium-thionyl chloride (Li-SOCl2) AA sized batteries, using an external solar or battery power pack, or via external power (12 - 24V DC @ 200mA or greater).

enLink OAQ can be specified with many environmental sensor options including laser scattering particle matter sensor and a variety of gas sensors. These sensors consume considerable power while actively sensing and therefore, to prolong battery life, the sampling interval should be set to the longest period practical for the application. Sampling / transmission intervals of less than 30 minutes place strain on the batteries, limiting their capacity and should be avoided when operating on battery power. If more frequent sampling is required then external power should be applied to the unit.

Where the OAQ unit is fitted with a gas sensor, please refer to the recommendations regarding power consumption in section 12.

Battery capacity is dependent on ambient temperatures and this should be considered when estimating battery life. Low temperatures slow down electrochemical reactions significantly and increase the internal resistance of the batteries. High temperatures increase the battery self-discharge. The chart below illustrates the effect of temperature on the available battery capacity.



Battery Capacity vs Current at Various Temperatures for SAFT LS14500 Batteries

Battery life is also highly dependent on the LoRa spreading factor used. Higher spreading factors result in longer active times for the radio transceivers and shorter battery life. Positioning devices in closer proximity to a gateway will generally result in lower spreading factors, shorter time on air and much lower transmit power.

14. Battery Life

Battery life is significantly reduced at low temperatures. See the chart above.
For example, at -20°C the battery life would be reduced by 0.6. For example: 12 month battery life at 21°C, would be 4.8 months at -20°C.

Below is a table showing the Estimated OAQ Battery Life for various OAQ models and sensor configurations. The battery life estimates are based on a battery temperature of 21°C.

OAQ Version	Sensors Fitted	Settings	LoRa Spreading Factor	Transmission Interval	Estimated Battery Life*
OAQ	-Temperature -Relative Humidity -VOC's -Barometric Pressure -Particulate Matter	EPA Index Sensor Off	7	30 Minutes	1.6 Years
OAQ	-Temperature -Relative Humidity -VOC's -Barometric Pressure -Particulate Matter	EPA Index Sensor Off	12	30 Minutes	1.2 Years
OAQ-C	-Temperature -Relative Humidity -VOC's -Barometric Pressure -Particulate Matter -CO2	EPA Index Sensor Off	7	30 Minutes	1.5 Years
OAQ-C	-Temperature -Relative Humidity -VOC's -Barometric Pressure -Particulate Matter -CO2	EPA Index Sensor Off	12	30 Minutes	1.1 Years
OAQ-C	-Temperature -Relative Humidity -VOC's -Barometric Pressure -Particulate Matter -CO2 -Additional Gas Sensor Fitted	EPA Index Sensor Off. Gas Sensor set to: -Idle state: OFF -Preamble: 60 sec -No. Reads: 5 -Read Interval: 3 sec	7	30 Minutes	1.3 Years
OAQ-C	-Temperature -Relative Humidity -VOC's -Barometric Pressure -Particulate Matter -CO2 -Additional Gas Sensor Fitted	EPA Index Sensor Off. Gas Sensor set to: -Idle state: OFF -Preamble: 60 sec -No. Reads: 5 -Read Interval: 3 sec	12	30 Minutes	1.1 Years
OAQ-C	-Temperature -Relative Humidity -VOC's -Barometric Pressure -Particulate Matter -CO2 -Additional Gas Sensor Fitted	EPA Index Sensor Off. Gas Sensor set to: -Idle State: SLEEP -Preamble: 30 sec -No. Reads: 5 -Read Interval: 3 sec	7	30 Minutes	1.2 Years
OAQ-C	-Temperature -Relative Humidity -VOC's -Barometric Pressure -Particulate Matter -CO2 -Additional Gas Sensor Fitted	EPA Index Sensor Off. Gas Sensor set to: -Idle State: SLEEP -Preamble: 30 sec -No. Reads: 5 -Read Interval: 3 sec	12	30 minutes	1 Year

* Battery life depends on factors including, but not limited to transmission interval, wireless signal strength and temperature.

15. Battery Installation / Replacement

For battery power, enLink OAQ devices use 4 x SAFT LS14500 or EVE ER14505 AA size 3.6 volt lithium-thionyl chloride (Li-SOCl2) batteries (non-rechargeable) or direct equivalent.

No other batteries are approved for use in the device.

Lithium-thionyl chloride batteries have very high energy capacity and must be used and handled with care observing the guidance below.

WARNING!

Risk of death or serious injury from explosion or fire.

- Keep out of sight and reach of children.
- Fire, explosion and burn hazard - do not recharge, short circuit, crush, disassemble, incinerate.
- Due to the high terminal voltage (3.6V), they are not suitable as direct replacements for other battery technologies in the same can sizes.
- When not in use the batteries must be stored in a non-hazardous area.
- Do not change batteries in an explosive gas atmosphere.
- When installing batteries, do not snag the battery terminal on the clip or the battery may be damaged. Do not apply excessive force.
- Do not drop. Dropping the battery may cause damage. If a battery is dropped, do not install the dropped battery into the unit
- Dispose of dropped battery promptly per local regulations or per the battery manufacturer's recommendations.

Guidance

- Always install the batteries correctly as per instructions taking great care to observe the battery polarity.
- Ensure that the contact points are clean and conductive.
- All batteries must be the same model from the same manufacturer.
- Do not mix old and new batteries or batteries from different manufacturers.
- Do not heat or attempt to recharge the battery.
- Do not dispose of in a fire.
- Only install approved batteries: SAFT LS14500 or EVE ER14505 Lithium-thionyl chloride AA battery 3.6 volt, or direct equivalent.

Safe Disposal

- Please recycle responsibly, a wide range of schemes are available.
- Do not dispose of in normal waste or in a fire.

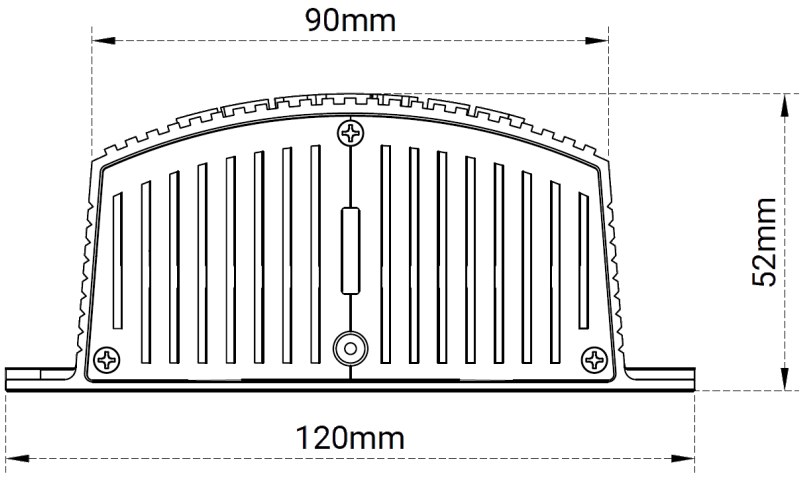
16. OAQ Mounting Details

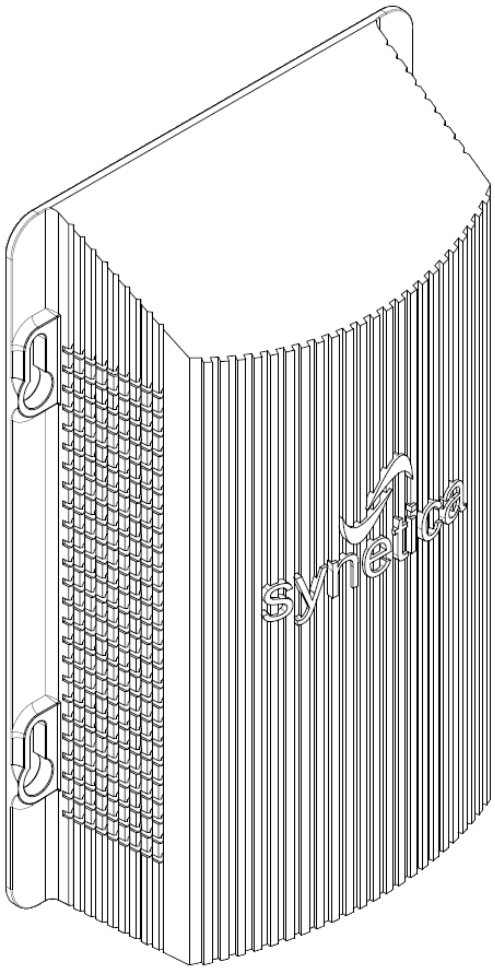
The OAQ should be fixed to a building wall which faces away from the sun, which is on the north side in the northern hemisphere (or south facing in the southern hemisphere). They should not be exposed to direct sunlight. The units are best placed in the middle of the building at least 3m above the ground and away from any exhaust ducts or flues.

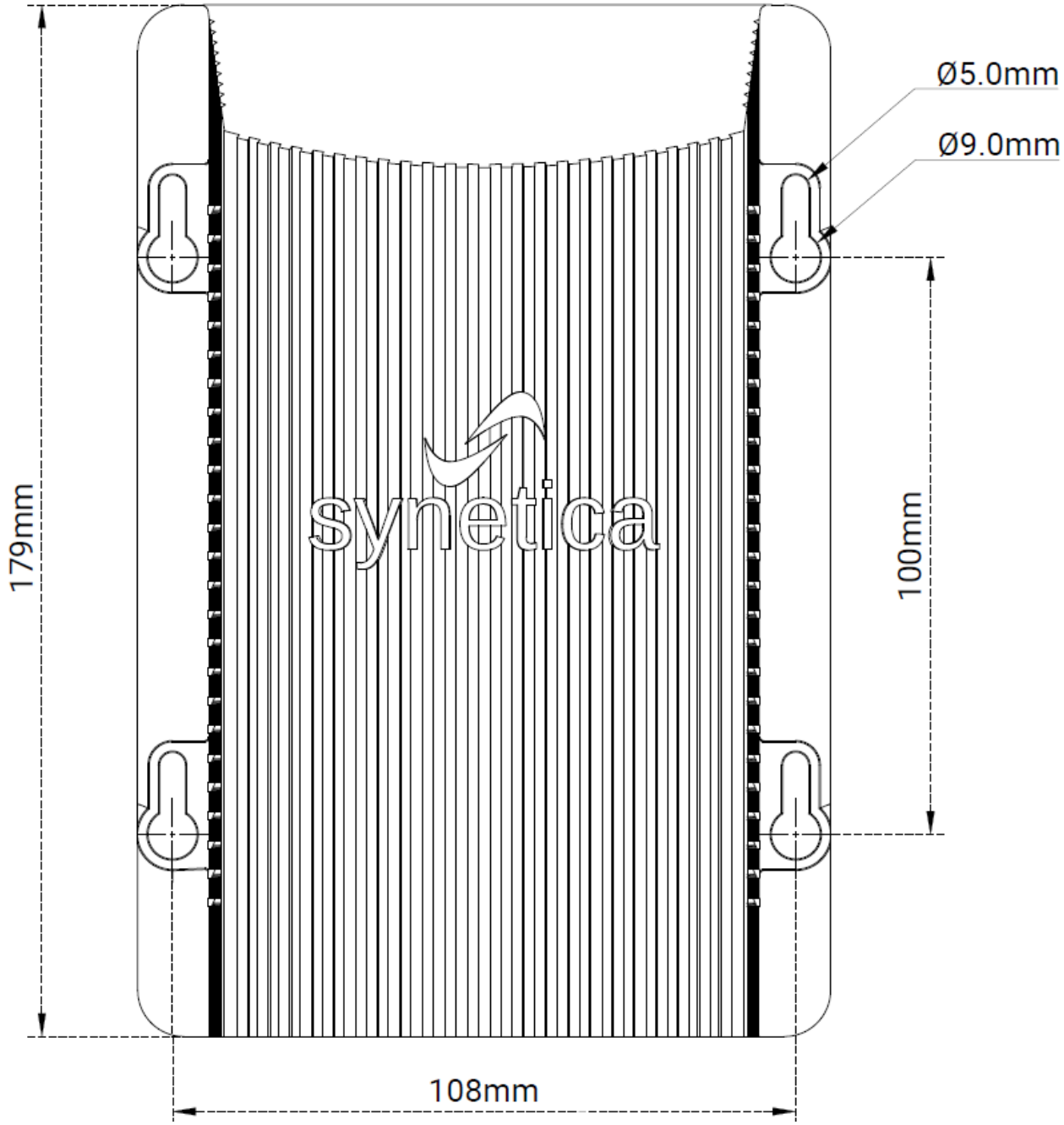
Mounting guidelines for OAQ Units:

- Do not expose to direct sunlight.
- Do not mount on facades with a lot of ascending heat.
- Do not attach to walls in front of a chimney.
- Do not mount on eaves or a balcony.
- Do not place over windows.
- Do no mount over ventilation shafts.
- Do not paint over sensors.
- Mount sensors in an accessible location to allow easy inspection and maintenance.

The OAQ should be fixed to a wall or bracket using number 8 pan head screws. (4.5mm thread and 8.5mm pan head).







Fix the screws to the wall or bracket using suitable pan head screws and then slide the OAQ onto the screws.

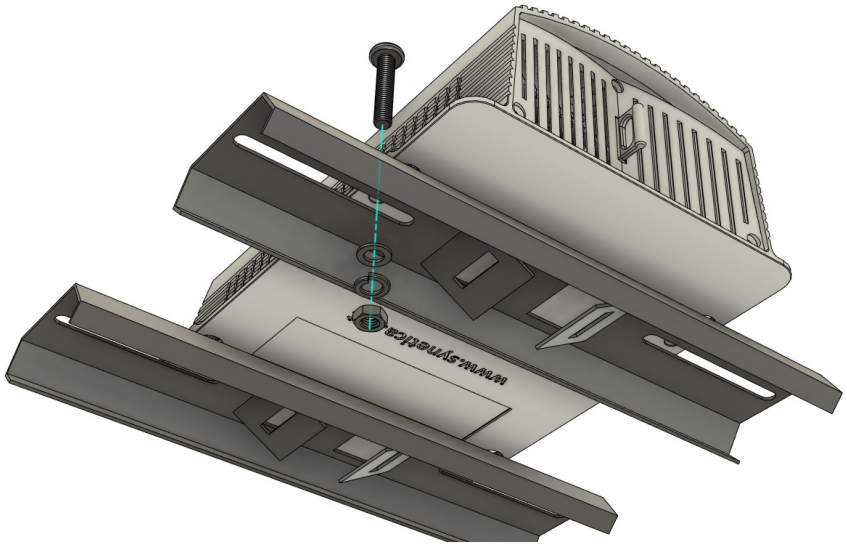
Use 4 x No.8 Pan Head Screws or 4 x M5 Pan Head bolts.

- Weight (without batteries): 180g
- Weight (with batteries): 250g

17. Pole Mount Kit Installation

Position the mounting brackets as shown on the below image, and attach to the rear of the OAQ, using the M5 screws that are included.

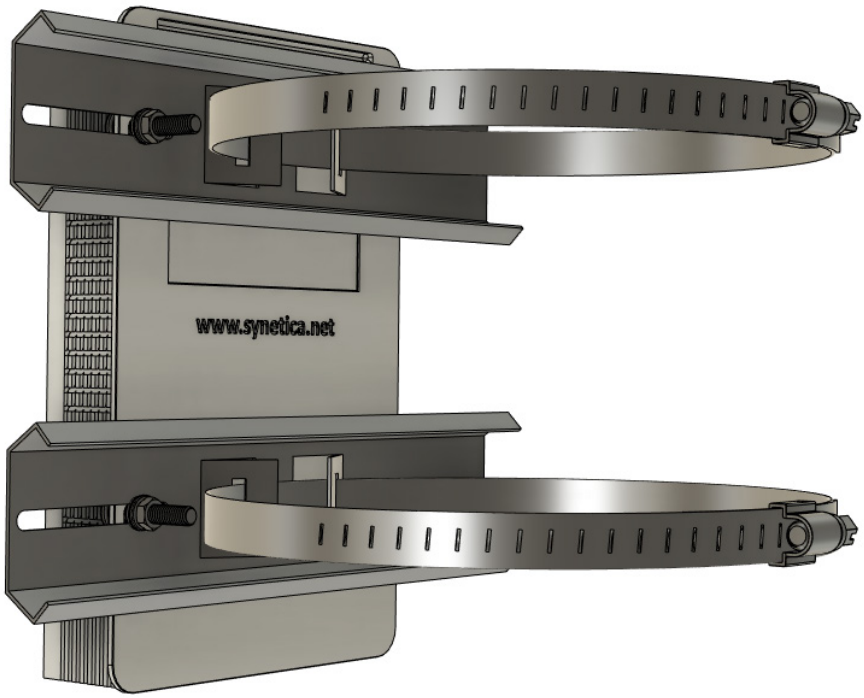
Ensure when screwing in the brackets the parts are orientated as shown in the below diagram.



Feed the stainless-steel adjustable bands through the mounting brackets as shown.
Note: thread steel bands through brackets before securing to the pole.

The adjustable bands included in the kit can be used on poles ranging from 1.5” to 8” in diameter.

Additional stainless steel adjustable bands can be purchased if required – 4 sizes are available for use with pole sizes ranging from 4” diameter to 17.5” diameter.



18. LoRaWAN Payload Decoder

The latest LoRaWAN payload decoders and guides are available on the Synetica GitHub repository:

https://github.com/synetica/enlink-decoder

A live payload decoder which allows you to paste LoRa payloads in Hexadecimal or Base 64 and see the correctly decoded results can be found at the link below:

https://synetica.github.io/enlink-decoder/

19. Technical Support

For technical assistance, please visit the downloads section of our web site at www.synetica.net or email us at support@synetica.net

About us

Synetica was established in 2008 with the simple idea to revolutionise air quality monitoring, energy usage and remote asset monitoring. Our global customer base relies on our expertise to help them reduce emissions and clean up the air they breathe by allowing them to monitor their energy usage and key environmental parameters via the touch of a button.

www.synetica.net

T: **+44 (0)1785 818919** E: **enlink@synetica.net**

Synetica Limited, Hilton House, 40 High Street, Stone, Staffordshire. ST15 8AU UK

Rev 2.2